

Laselle

TESTS
OF
JOINTING MATERIALS
FOR
Vitrified Clay Pipe

BY
S. E. DIBBLE
College of Industries Carnegie Institute of Technology
Pittsburgh, Penna.

Also Report of
Bureau of Surveys, City of Philadelphia, Penna.
And with Table of Amounts of Jute and
Compounds Required Per Joint A.S.T.M.
C-13-35 Vitrified Salt Glazed Clay Sewer Pipe.

ISSUED BY
Clay Products Association
111 W. Washington Street
CHICAGO, ILL.

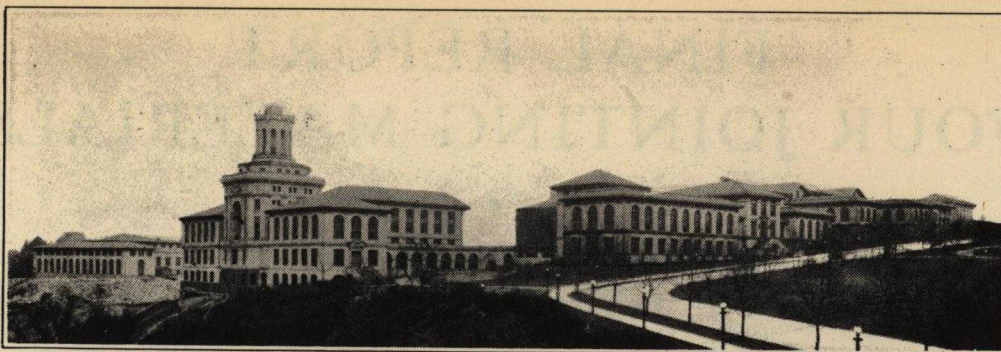
**SPECIFY AND USE
VITRIFIED SALT GLAZED CLAY
SEWER PIPE
FOR
SEWERAGE CONSTRUCTION**

**In Sizes
4 INCHES TO 36 INCHES**

For Larger Sizes of Sewers

**USE
SEGMENTAL BLOCKS
And As a Protection for Concrete Sewers Use
LINER PLATES**

**Both Made of the Same Material as
VITRIFIED SALT GLAZED CLAY
SEWER PIPE**



Carnegie School of Technology, Pittsburgh, where Mr. S. E. Dibble's Exhaustive Tests were conducted.

ONE main fact stands out as a result of the twenty-one tests which are described in the following pages, and that is that **VITRIFIED CLAY PIPE CAN BE JOINTED AND THE JOINTS CAN STAND A PRESSURE OF 10 LBS. WITHOUT SHOWING ANY LEAKS** provided a compound is used similar to those mentioned in this report. The following practice should be used when pouring compound:

First—Packing such as oakum or jute must be used and caulked into the annular space to act as a packing and to hold the molten compound into the annular space until it has thoroughly set.

Second—A joint runner must be used when the pipe is in a horizontal position. This joint runner may be of the metal flexible type or asbestos rope type or may be made of clay that is sometimes found on the job. The joint runner must be perfectly tight so as to hold the compound and not allow it to run outside into the ditch.

Third—The compound must be poured when it is very hot and runs like water.

Fourth—A pouring device or ladle should be used that is large enough to fill the annular space in one pour.

Fifth—The joint runner should not be taken off until the compound is set. This is a matter of probably four or five minutes.

These tests established **WITHOUT A DOUBT THAT THE COMPOUND JOINT WILL STAND A WATER PRESSURE TEST SUCH AS IS GIVEN TO THE ORDINARY PLUMBING INSTALLATION.** With such care as a skilled mechanic would naturally give the making of a joint of this kind, the joint could be made to stand any pressure that the pipe is capable of withstanding.

These tests also have proven that a line of pipe can be thrown out of alignment and the joint still be tight. The tests also proved that in case a leak developed in a compound joint that it could be readily fixed and made tight by the application of heat and added material. With reasonable care such as would be given by a careful drain layer there would be no possibility of a leak in any joint provided the joint was first packed with one strand of oakum and the compound poured while it was very hot.

Respectfully submitted,

S. E. DIBBLE,

Head, Heating and Ventilating Department

Professor of Chemistry

Department of Industrial Science

FINAL REPORT

FOUR JOINTING MATERIALS

By

PROFESSOR R. B. LEIGHOU

College of Industries

Carnegie Institute of Technology

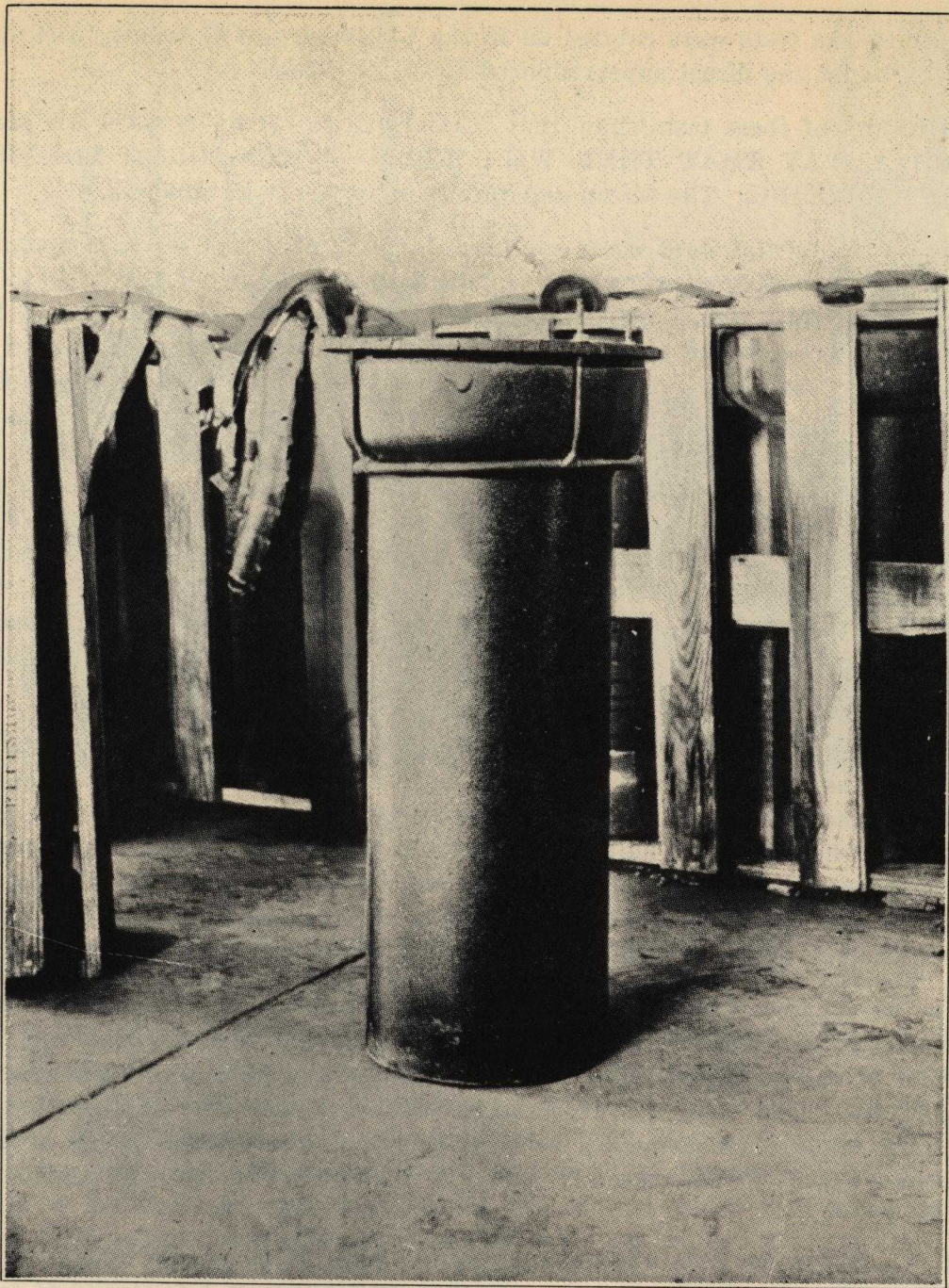
	No. I	No. II	No. III
Specific Gravity 25°/25° (77°/77° F.)	1.501	1.543	1.415
Coefficient of Cubical expansion per C°. (Water figure—0.0002)	0.00056	0.00059	0.00046
Melting point (Ring and ball method) . .	105°C. (221°F.)	96°C. (205°F.)	74°C. (165°F.)
Viscosity at 175° C. (347° F.) (Engler)	29'12"	10'38"	27'35"
Total bitumen (soluble in Cs.)	49.32%	41.05%	57.32%
Organic matter (insoluble)	3.36	0.03	2.76
Inorganic matter insoluble	47.32	49.92	39.92
Volatile matter	42.45%	39.90%	54.17%
Fixed carbon	10.23	10.18	5.91
Ash	47.32	49.92	39.92

Composition of ash

Silica (SiO ₂)	69.14%	82.36%	1.67%
Alumina (Al ₂ O ₃)	23.62	1.64	4.19
Iron Oxide (Fe ₂ O ₃)	4.75	.90	1.41
Lime (CaO)	1.33	2.32	54.11
Magnesia (MgO)	1.07	8.84	36.25
Sulfuric anhydride (SO ₃)	n. d.	2.02	2.69
Alkalies (Na ₂ O and K ₂ O)	n. d.	1.87	...

Universal Portland Cement

Loss on ignition	2.35%	...	...
Silica (SiO ₂)	18.85	...	...
Lime (CaO)	63.61	...	...
Alumina (Al ₂ O ₃)	7.42	...	...
Iron Oxide (Fe ₂ O ₃)	4.11	...	...
Magnesia (MgO)	1.60	...	...
Sulfuric anhydride (SO ₃)	1.52	...	...



FLANGE ON HUB END OF PIPE

FINAL REPORT

March 10, 1922

Test of Jointing Materials for Vitrified Clay Pipe

By

S. E. DIBBLE

College of Industries, Carnegie Institute of Technology

The following tests have been made to determine whether or not cement joints and "compound" joints could be successfully made to stand a five and ten pound gauge pressure. Tests have also been made to establish a procedure for the making of joints to stand a ten to twenty foot head. Actual conditions, as nearly as possible, have been carried out throughout the entire tests; only tools and methods used in a trench were used. No care was taken to prepare the bell or the end of pipe in any way.

The following tests were carried on in the Laboratory of Carnegie Institute of Technology under the direct supervision of Mr. S. E. Dibble.

The results of these tests show that "COMPOUND" JOINTS CAN BE MADE IN SUCH A WAY THAT THEY WILL STAND A TEN-POUND PRESSURE WITHOUT LEAKING. The set-up and results of tests are as follows:

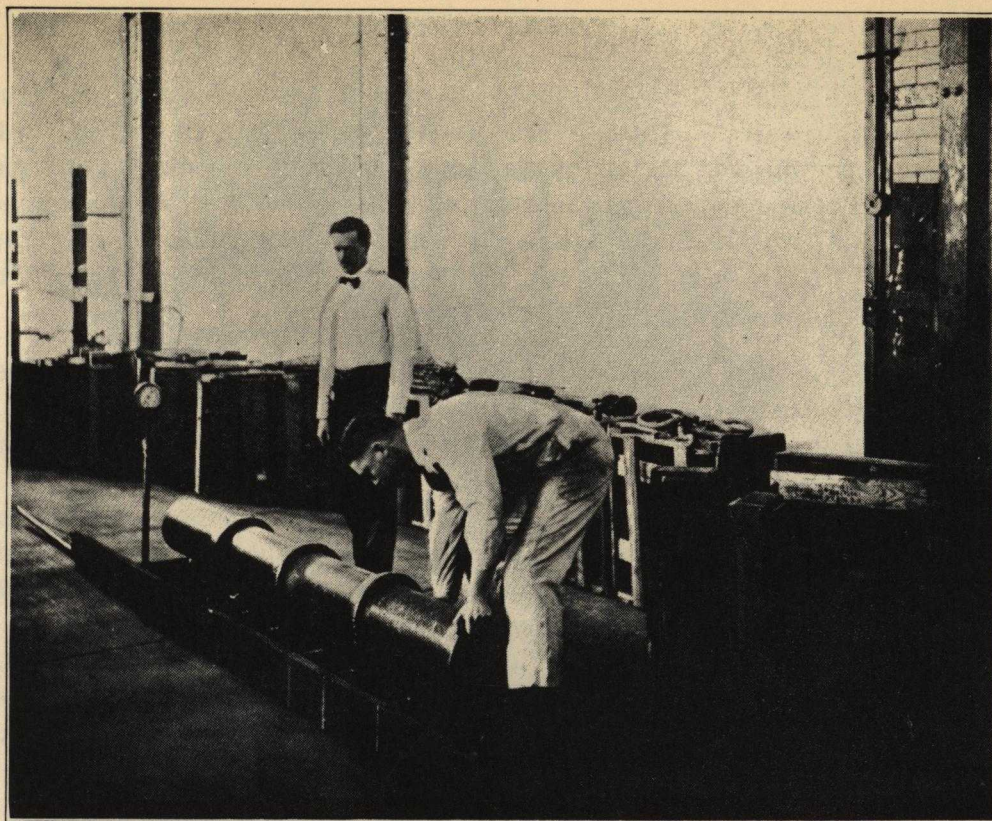
Test No. 4—*To furnish data when unskilled labor is used and when compound is poured when too cool, also when pipe is forced out of alignment.* 4" pipe jointed with compound, three joints being made, using four lengths of pipe laid in horizontal position. One strand of oakum was used to pack each joint. Compound was poured when it was at the consistency of thin cream. Results showed compound was poured when too cool. A joint runner made of rope asbestos was used and removed ten minutes after joint was poured. Water pressure was applied. All joints were tight at 5 lbs., and at 10 lbs. a leak appeared in joint No. 1. In joint No. 2 a leak appeared after test had been on fifteen minutes and joint No. 3 was tight after test had been on thirty minutes. Unskilled labor was used in making joints. This pipe was raised and supports put under each end, leaving center pipe and all joints without support. After forty-eight hours the pipe had sagged sufficiently to cause leaks in all joints. These joints were made tight and did not leak when test was again applied.

Test No. 5—*To show tightness of joints by using cement and sand.* 6" pipe, four lengths being used, making three joints. One strand of oakum was caulked into the annular space and the joint was made with Portland cement and sand, proportion being one-half and one-half. After setting twenty-four hours a pressure of three pounds was applied and the joints showed no leaks; a pressure of 6 lbs. was then applied and all joints leaked. The reason for the joints leaking was due to the small amount of cement that was applied to the joint.

Test No. 6—*To give data when cement and sand are used.* Four joints of 8" pipe, making three joints. One-half Portland cement and one-half sand was used. One strand of oakum was caulked in each joint and the joint was made with the above mixture. The cement was brought well over the hub of the pipe and extended out about 2 inches on the straight length of pipe. These joints all stood 5 lbs. pressure without showing any leak. A pressure of 15 lbs. was applied and all joints leaked.

Test No. 7—*To furnish data when neat cement is used.* 8" pipe, four lengths making three joints. Neat Portland cement was used in making joints, one strand of oakum was first inserted in the annular space, the neat Portland cement was mixed and the annular space completely filled, cement lapping over onto the hub and extending 2 inches out on the straight pipe. The cement was allowed to set for forty-eight hours, at which time the pipe was completely filled with water and subjected to a hydrostatic test of 4 foot head. No leaks developed with this pressure. 5 lbs. gauge pressure was then applied and a leak developed due to poor workmanship in the bottom of one joint. 5 lbs. pressure was then increased and leaks developed in all the joints both at the top and at the bottom. Unskilled labor prepared the joints.

Test No. 8—*To give data when cement and sand are used.* 10" pipe and cement was used in this test. The mixture of cement was one-half sand and one-half cement. The annular space was first packed with one strand of oakum and the cement was lapped over on the hub. After allowing to harden for forty-eight hours a pressure of 3 lbs. was applied; the result was that all the joints leaked. It was evident by this result that the cement should have been carried over the hub and extended



SETTING PIPE ON LADDER FORMATION RACK

along the pipe at least two or three inches. The cement should have been applied with a trowel and skilled labor should have made the joint.

Test No. 9—*To furnish data on repairing a leak in compound joint.* 4" pipe was used and the three joints were made by the use of compound. The annular space in pipe was first caulked with one strand of oakum, then the compound was poured at about 360° Fahrenheit. An asbestos joint runner was used in this test. Before fixing the joint runner it was thoroughly wet and then tamped around the pipe. A test of 5 lbs. pressure was immediately applied. A small leak appeared in the second joint and this was made tight by first relieving the pressure and then melting the compound around the joint near where the leak appeared and then applying more compound which was in a plastic condition. The compound was then pressed against the sides of the hub and pipe, after which the torch was again applied and the surface of this patch was completely melted and allowed to just flow. The test was again applied and all joints were tight at 5 lbs. pressure. These four lengths of pipe were then lifted and supported at each end, leaving the three joints without support. 180 lbs. (weight of one man) was then placed on top of the middle joint and the 5 lbs. pressure again applied after the pipe was out of alignment. All joints were tight.

Test No. 10—*To furnish data on tightness of compound joint after being moved around.* 8" pipe was used, three lengths making two joints. Compound was used with an asbestos joint runner. This compound was heated until it ran like water. The compound was allowed ten minutes to set and cool, then 5 lbs. pressure was applied, and all joints were perfectly tight. This pipe was moved across the room, carried by two men, and set upon a framework and a test again applied, and all joints remained tight.

Test No. 11—*To furnish data on tightness of joint when pouring opening was built up.* Four lengths of 6" pipe were used making three joints. Compound was used after caulking each joint with one strand of oakum. An asbestos joint runner thoroughly soaked in water was used. It is found necessary in these tests to build up the pouring opening on the top of the pipe where the asbestos joint runner comes together. These openings can be built up sufficiently to allow the compound to perfectly fill the entire annular space, by using ordinary mud or clay that is found on the job. A pressure of 10 lbs. applied to these joints proved all tight, showing no signs of moisture.

Test No. 12—*To furnish data on temperatures of compound, and forcing pipe out of alignment.* Four lengths of 4" pipe jointed with one strand of oakum and compound. Compound was poured at about 450° and the asbestos joint runner which was used was taken off four minutes after the joints were poured. The test of 5 lbs. was immediately applied and all joints were tight. These four lengths of pipe were then raised and supports placed under each end, leaving all joints in which there was compound without any support. The pipe was then forced out of alignment about one diameter or four inches and allowed to stand in that position for forty-eight hours, after which a test of 5 lbs. was applied. Leaks appeared at the bottom of the middle joint and this was immediately stopped by heating the compound slightly and adding a small amount of compound where the leak appeared.

Test No. 13—*To supply data on the temperature and speed of pouring.* Two lengths of 10" pipe was used with compound as a jointing material. These joints were poured with the pipe in a horizontal position after one strand of oakum had been caulked into each joint. The compound was brought up to a temperature of about 480° and poured VERY SLOWLY. A test of 5 lbs. was immediately applied, and it was found that one joint leaked a trifle. This was due to the SLOW POURING of the molten compound, which showed that WHEN LARGER SIZED PIPES ARE TO BE JOINTED WITH THIS COMPOUND THAT THE JOINTING MATERIAL MUST BE VERY HOT AND MUST BE POURED VERY RAPIDLY to avoid its cooling and setting before reaching the bottom of the joint. This leak which developed in this test was immediately heated and made tight. The test was again applied and joints were found perfectly tight.

Test No. 14—*To supply data when oakum was loosely packed, also when pipe is placed vertically.* Three lengths of 8" pipe, making two joints, were set in a vertical position, the annular space of each joint having one strand of oakum caulked into it to act as a packing and to keep the compound from running into the bore of the pipe. The compound was poured at a temperature of about 330°. It required two ladles to completely fill the annular space. After the joint had cooled the pipe was carried across the room, laid on the floor and subjected to the 5 lbs. pressure test. The joints were entirely tight and showed no leak at any point. Joint No. 1 on this test had been so arranged with loosely packed oakum so that a leak would develop in case the oakum was not perfectly packed. The result of this was that the heated compound completely surrounded and permeated the oakum which was left loose and made the entire joint tight. A further test of 10 lbs. was applied to this 8" pipe and then a 12 lbs. test. Finally a 15 lbs. test was applied and all joints remained tight.

Test No. 15—*To furnish data when glazed and unglazed pipe is used, and pipe placed in vertical position.* Three lengths of 6" pipe, two of which were glazed and one unglazed, making three joints, were placed in an upright position. After one strand of oakum had been packed into each joint, compound was poured and the



POURING COMPOUND

annular space was not quite filled. A space of about $\frac{3}{8}$ " from the top was without compound. This pipe was then placed in a horizontal position, a test of 5 and then 10 and then 15 lbs. was applied, and all joints remained tight.

Test No. 16—*To supply data when oakum is wet, and pipe is wet.* Three joints of 4" pipe were placed in a horizontal position and into the annular space one strand of oakum SOAKED WITH WATER WAS PACKED. The entire bell and socket were saturated with water by dousing a pail full of water on top of the bell. While everything was wet the asbestos joint runner was placed around the joint and the compound poured while it was very hot. The result, after a 5 lbs. test was applied, was that each joint leaked very badly. This was accounted for by the formation of steam as the hot compound struck the water. The water immediately chilled the compound and the steam that was produced prevented contact between the compound and the walls of the pipe and bell.

Test No. 17—*To give data when oakum is placed dry and pipe and annular space is wet.* Two lengths of 4" pipe, making one joint, was placed in a horizontal position and one strand of dry oakum was caulked into the annular space. Then a pail full of water was thrown on to the bell, thoroughly wetting the gasket socket and pipe around the joint. Compound was then poured and leaks were evident on all sides of the joint, proving that this compound can not be used to make a tight joint where water comes in direct contact with the molten material.

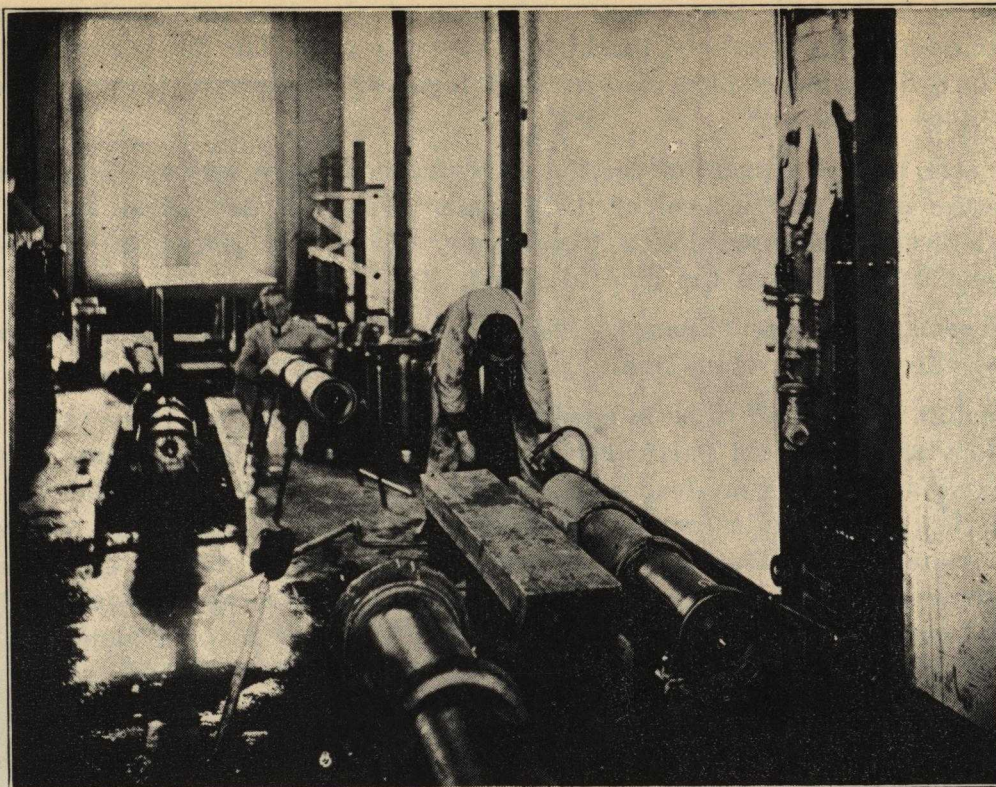
Test No. 18—*To furnish data on repairing a leak in bottom of pipe, when in a trench.* Three lengths of 10" pipe, making two joints, were placed in a horizontal position and compound poured so as to develop a definite leak for the purpose of testing and finding an exact method of patching where leaks occurred. This pipe was then placed in such a position that it represented the bottom of a ditch;

that is, that the working space around the pipe was only two feet. In this position the portion of a joint where a leak developed was placed at the bottom of the ditch. All pressure on the interior of the pipe was relieved and a torch was applied to the underside or to the point where the leak developed. After the compound had started to melt an additional amount of compound was applied when it was at the consistency of soft putty. This added material was well pressed against the pipe and against the hub, the torch then being applied to melt the surface. Seven minutes only were required to make this patch, after which a test of 5 lbs., and then 10 lbs., was applied and the joint was perfectly tight.

Test No. 19—*To determine data when compound is poured with pipe in a vertical position.* Three lengths of 10" pipe were used, making two joints, and placed in a vertical position. The annular space was filled with one strand of oakum and this oakum was thoroughly caulked, care being taken to tamp the oakum so that it made a solid packing. Compound was then used as a jointing material. This material when molten flows freely, almost like water. After the joints were poured they were placed in a horizontal position and the test of 5 lbs. was applied. Then a test of 10 and 15 lbs. was applied. No joints leaked. A further test of 20 lbs. was applied and the joints were still tight.

Test No. 20—*To supply data when glazed and unglazed pipe are placed in vertical position, also when pipe is moved before test.* Two lengths of 6" pipe, one glazed and the other unglazed, was placed in a vertical position, each being packed with one strand of oakum. Compound was used. After joints had cooled the pipe was laid on a horizontal rack, pipe being supported in three places and a pressure of 5 lbs. applied for ten minutes. All the joints were tight. A pressure of 10 lbs. applied for ten minutes proved all joints tight. A pressure of 15 lbs. showed the joints perfectly tight. Further pressure of 20 lbs. was applied and joints were still tight.

Test No. 21—*To furnish data on tightness of compound joint.* Three lengths of 4" pipe placed in an upright position, one strand of oakum being caulked into the annular space. Compound was then poured into the joints. A pressure was then at once applied of 5 lbs. and all joints were tight; then at 10 lbs. and 15 lbs. pressure; all joints were tight. All these joints which up to this twenty-first test had been poured in an upright position have shown no indication of leak and seem to have made a perfect adhesion to the walls of the pipe and to the walls of the bell.



SET UP IN TRUCK FOR REPAIRING LEAK IN JOINTS

CITY OF PHILADELPHIA, PA.

DIVISION OF SEWERS

BUREAU OF SURVEYS

Bituminous Compound Joints

The attached table is the record of tests of bituminous compound joints made on the dates shown to determine the lasting qualities of compound joints for vitrified clay pipe under service conditions. Three compounds were used, all proving of about equal value. Jute gaskets, free from oil or tar, and G. K. gaskets were used to caulk the joints. Twenty joints (two pipes of 2 ft. length being used for each joint) were made up and tested under hydrostatic pressures, after which they were placed in trenches about 4 ft. in depth. Ten joints were placed in a dry sand and loam soil and ten joints were placed in a wet marsh mud. All being left in place for one year, at the expiration of which time they were taken up, inspected and retested. Unfortunately, it was necessary to move the pipes long distances to and from the trenches, subjecting them to rough handling, and in their recovery it was also necessary to relocate the pipe by probing with a bar; the exact location of the trenches having been lost through flooding, and the moving of material over them. In this effort to relocate them, some of the pipes were slightly cracked and a retest of those joints could not be made.

The first joint on the list is not included in the service test, it being one of a number of joints tested for maximum pressure. One 12-inch pipe joint in this series withstood a pressure of 85 lbs. per square inch without leaking, the pipe breaking at that pressure.

Internal hydrostatic pressure test of many single pipes proved them capable of withstanding high pressures, the highest pressure being 110 lbs. per square inch applied to a 6" diameter pipe in a gradual increase of pressure through about a one-half hour period.

The zero in each column of the list indicates that there was no leakage under the pressure noted at the head of the column. The first date given in the date column indicates the time joints were made, tested and placed in the trench. The second date indicates the date of retest.

The remarks in the "Remark" column apply to the tests corresponding to the date with which it is in line.

All joints were found to be in good condition when taken up; those taken from the wet marsh mud being particularly bright and plastic. These joints received severe handling. They were loaded on a motor truck, hauled about a quarter of a mile and then wheeled in a barrow about one hundred feet to the trench, excavated in thick marsh mud. During the year the marsh became flooded and when it became necessary to remove the pipe they first had to be located by probing with a bar and then hooked out, broomed off, carried about 50 ft. to a hand car, conveyed to a point within four or five hundred feet of the laboratory, loaded on a motor truck, unloaded, thoroughly washed off and tested.

A chemical test of the compound taken from joints after the pressure retest practically equalled the original chemical test made before the joints were made—indicating no loss during the period under ground. A number of the joints were relaid in trenches for future tests.

August 1, 1921.

TESTS OF BITUMINOUS COMPOUND JOINTS OF SALT GLAZED VITRIFIED CLAY SEWER PIPE

Made by the

BUREAU OF SURVEYS, CITY OF PHILADELPHIA, PA.

Date	Compound	No. and Class	Int. Diam. In.	Len. Ft.	Percolation						Remarks
					5 lbs. 5 m.	10 lbs. 5 m.	15 lbs. 5 m.	20 lbs. 5 m.	25 lbs. 5 m.	30 lbs. 15 m.	
6-18-19	G. K.	750-ST	8	2	0	0	0	0	0	0	Pipe broke at 55 lbs. No leakage at joint.
6-24-19	35 oz.	755-ST	8	2	0	0	0	0	0	0	Joint leaked when pipe was filled and pipe broke at 30 lbs. after 2 m.
7-19-20	G. K. Gasket.	757-DW	8	2	0	0	0	0	0	0	Pipe cracked around bell when pressure increased to 25 lbs.
6-28-19	36 oz.	645-DW	8	2	0	0	0	0	0	0	Upper pipe cracked at 20 lbs. No leak at joint.
7-19-20	G. K. Gasket.	753-ST	8	2	0	0	0	0	0	0	Joint leaked at 30 lbs. after 5 m.
6-28-19	34 oz.	647-ST	8	2	0	0	0	0	0	0	Pipe was found cracked. No test.
7-19-20	Jute Gasket.	763-DW	8	2	0	0	0	0	0	0	Slight leak in joint at 20 lbs. after 10 m.
6-28-19	37 oz.	760-DW	8	2	0	0	0	0	0	0	Pipe cracked. No retest.
7-19-20	Jute Gasket.	785-ST	10	2	0	0	0	0	0	0	Pipe cracked. No retest.
6-28-19	36 oz.	778-DW	10	2	0	0	0	0	0	0	Joint O. K. up to 30 lbs. Pipe buried for future test.
7-19-20	G. K. Gasket.	783-ST	10	2	0	0	0	0	0	0	Pipe cracked. Not tested but joint very good.
6-28-19	41 oz.										Slight leak at 15 lbs. Excessive leakage at 25 lbs. Test discontinued at 25 lbs.
7-19-20	G. K. Gasket.										Joint commenced to leak at 30 lbs. after 7 m.

TESTS OF BITUMINOUS COMPOUND JOINTS OF SALT GLAZED VITRIFIED CLAY SEWER PIPE
Made by the
BUREAU OF SURVEYS, CITY OF PHILADELPHIA, PA.

Date	Compound	No. and Class	Int. Diam. In.	Len. Ft.	Percolation						Remarks
					5 lbs. 5 m.	10 lbs. 5 m.	15 lbs. 5 m.	20 lbs. 5 m.	25 lbs. 5 m.	30 lbs. 5 m.	
6-28-19 7-19-20	54 oz. G. K. Gasket.	765-DW	10	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint failed at 30 lbs.
6-28-19 7-19-20	34 oz. G. K. Gasket.	787-ST	10	2	0	0	0	0	0	0	Joint leaked at 30 lbs. Pipe cracked. Unable to test.
6-28-19 7-19-20	36 oz. Jute Gasket.	781-ST	10	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint O. K. up to 30 lbs. Pipe buried for future tests.
6-18-19 7-19-20	 Jute Gasket.	793-DW	12	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint O. K. up to 30 lbs. Pipe buried for future test.
6-18-19 7-19-20	 G. K. Gasket.	827-ST	12	2	0	0	0	0	0	0	Pipe cracked. Unable to test. Joint in good condition.
6-24-19 7-19-20	40 oz. G. K. Gasket.	794-DW	12	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint O. K. up to 30 lbs. Pipe buried for future test.
6-28-19 7-19-20	58 oz. G. K. Gasket.	790-DW	12	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint leaked slightly at 30 lbs. Pipe buried for future tests.
6-28-19 7-19-20	57 oz. G. K. Gasket.	797-DW	12	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint O. K. up to 30 lbs. Pipe buried for future tests.
6-28-19	89 oz. G. K. Gasket.	798-DW	12	2	0	0	0	0	0	0	Joint leaked at 10 lbs.
6-28-19 7-19-20	60 oz. Jute Gasket.	800-ST	12	2	0 0	0 0	0 0	0 0	0 0	0 0	Joint leaked at 25 lbs. Buried for future tests.

Lbs.—Pounds Per Sq. In. M.—Minutes Duration of Test. Len.—Length of Pipe. Int.—Internal Diameter of Pipe.

CLAY PRODUCTS ASSOCIATION
111 W. WASHINGTON ST.,
CHICAGO, ILLINOIS

AMOUNTS OF JUTE AND COMPOUND REQUIRED PER JOINT A.S.T.M. C 13-35 VITRIFIED SALT GLAZED SEWER PIPE

DIAMETER OF PIPE - INCHES			ANNULAR SPACE AT MOUTH OF SOCKET INCHES	DEPTH - INCHES			ANNULAR SPACE	VOLUME CUBIC INCHES		WEIGHT - POUNDS		
INSIDE	MOUTH OF SOCKET	OUTSIDE AT SPIGOT		SOCKET	JUTE	COMPOUND		JUTE	COMPOUND	JUTE 25 lbs. PER CU.FT.	COMPOUND 65 lbs. PER CU.FT.	COMPOUND 105 lbs. PER CU.FT.
4	5.875	5	1-3/4	3/4	1	12.1	5.1	7.0	.074	.32	.51	
6	8.425	7-1/4	2-1/4	1-1/4	1	30.0	16.2	13.8	.234	.62	1.01	
8	10.700	9-1/2	2-1/2	1-1/2	1	43.4	25.2	18.2	.365	.82	1.33	
10	12.950	11-3/4	2-1/2	1-1/2	1	53.2	30.9	22.3	.447	1.01	1.63	
12	15.350	14	2-3/4	1-3/4	1	78.8	48.9	29.9	.707	1.35	2.18	
15	18.975	17-1/2	2-3/4	1-1/4	1-1/2	107.0	47.0	60.0	.680	2.71	4.37	
18	22.500	21	3	1-1/2	1-1/2	140.5	67.6	72.9	.978	3.29	5.32	
21	26.150	24-1/2	3-1/4	1-3/4	1-1/2	195.0	101.2	93.8	1.464	4.23	6.84	
24	29.670	28	3-3/8	1-7/8	1-1/2	231.6	123.9	107.7	1.793	4.86	7.85	
27	33.425	31-1/2	3-1/2	2	1-1/2	316.1	174.8	141.3	2.529	6.38	10.30	
30	36.925	35	3-1/2	2	1-1/2	350.3	193.7	156.6	2.802	7.07	11.42	
33	40.35	38-1/4	4	2-1/2	1-1/2	474.3	286.2	188.1	4.141	8.49	13.72	
36	43.60	41-1/2	4	2-1/2	1-1/2	513.6	310.8	202.8	4.497	9.15	14.79	

NOTE: Weight of caulked jute 25 pounds per cubic foot.

Weight of compound 65 pounds per cubic foot

20 per cent of compound included in this table for possible wastage.

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